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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/554,415	10/24/2005	Thomas Sugar	09049-00004-US1	5350
30678 7590 08/20/2010 CONNOLLY BOVE LODGE & HUTZ LLP 1875 EYE STREET, N.W. SUITE 1100 WASHINGTON, DC 20006				
EXAMINER				
MATTER, KRISTIN CLARETTE				
ART UNIT		PAPER NUMBER		
3771				
MAIL DATE		DELIVERY MODE		
08/20/2010		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/554,415

**Applicant(s)**

SUGAR ET AL.

**Examiner**

KRISTEN C. MATTER

**Art Unit**

3771

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 August 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 10-18, 21-24 and 37-49 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10-18, 21-24 and 37-49 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB-06)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

This Action is in response to the amendment filed 8/9/2010. Claims 11-18, 21-24, and 37-49 have been amended, and no claims have been cancelled or added. Thus, claims 10-18, 21-24, and 37-49 are currently pending in the instant application.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 10-14, 18, 21, 37-41, 45, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ferrati (US 5,961,541) in view of Van der Linde (US 6,478,652), Wassam et al. (US 4,739,692, herein referred to as "Wassam") and Erickson (US 6,067,892).**

Regarding claims 10, 14, 21, 37, 41, and 46, Ferrati discloses a system of artificial muscles comprising a knee brace/first pivot member (17/22 with the associated rod seen in Figure 1), a foot support/second pivot member (on bottom of shoe and rod 10 seen in Figure 1) attached to the knee brace via a pivot joint (9), and a muscle actuator (16) coupled to both the knee and foot support at a location distal from the pivot joint (i.e., at heel and hip; see Figure 1).

Ferrati lacks the pair of muscle actuators being coupled to opposite sides on both the first and second pivot members (knee and foot supports). However, Van der Linde discloses a similar exoskeleton device with actuators (10) coupled on both sides of a brace member on the leg

(column 2, lines 10-15). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided muscle actuators on both sides of the leg as taught by Van der Linde instead of only on one side as shown in Ferrati in order to provide more even assistance or to allow better control of the limbs via more actuators and antagonist forces. Furthermore, there is nothing structurally in Ferrati preventing actuators from being placed on both sides of the limb and it appears as though Ferrati would perform equally well with such a modification.

Ferrati also discloses a pneumatic or hydraulic actuator (16) for moving the limb and thus lacks the specifically claimed actuator. However, McKibben-type muscle actuators are well known and commonly used in the art as demonstrated by Van der Linde (column 2, lines 50-55). In addition, Wassam discloses separately inflatable artificial muscle actuators comprising McKibben muscle actuators each having an inner bladder (14) connected at ends using a connector (13) and pressurized by a pneumatic source (17) so that the bladder expands in a radial direction (column 4, lines 25-35). The actuator includes a braided material (11) wrapped around and coupled to ends of the inner bladder (see Figure 1) such that when the bladder expands radially, the braided material contracts longitudinally (see column 4, lines 25-35). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the simple pneumatic actuator of Ferrati with the McKibben actuators of Wassam because it would have allowed more accurate and reliable control over the movement of the foot while walking. Such a modification would involve the mere substitution of a well known method (McKibben actuators) in a well known device (exoskeleton) to yield predictable results that do not patentably distinguish an invention over the prior art. Since there are two separate

actuators/bladders in the modified device, it would have been obvious to configure them such that they are separately pressurizeable (as is also suggested by Van der Linde's "antagonist" forces/actuators).

McKibben is silent as to the claimed mechanical device/helical springs (i.e., seems to be that the return of the bladder to its original length comes from actuation of a complementary actuator). However, Van der Linde discloses springs (14). In addition, Erickson discloses that in McKibben muscle actuators since the bladder can only retract/expand in a single direction, another external force must be supplied to return the bladder to its original position. That force can come from opposing actuators, springs, gravity, etc. (see column 8, lines 1-10). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided a mechanical device that expands the bladder ends longitudinally when the inner bladder is depressurized as taught by Erickson because it would have provided the means for returning the bladder to its original length so that the actuator could be used again to create the contraction/extension. Such a modification would involve the mere substitution of a well known means (spring, etc.) in a well known device (McKibben actuator) to yield predictable results that do not patentably distinguish an invention over the prior art. Obviously, in order for the spring to properly work and return the bladder to its original length it would have to be able to push against two mechanical components/connectors (see also Figure 1 of Van der Linde where a spring 11 is secured between two connectors).

Regarding claims 11-13 and 38-40, the modified Ferrati reference lacks shock absorbers for the mechanical devices (i.e., Erickson only discloses springs, other actuators and gravity).. However, shock absorbers are well known and commonly used for quick return of extensible

members (see cited art and also applicant's specification paragraph 58 in which shock absorbers are discussed as being prior art devices). Furthermore, applicant has never disputed examiner's assertion that the claimed shock absorbers are a well known equivalent to the springs for returning the actuators to their original length and therefore use of the claimed shock absorbers is now considered admitted prior art. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have replaced the spring of the modified Ferrati device with a shock absorber in order to provide a well known and commonly used means for quickly returning the extensible member to its original length and to allow more accurate control over the speed of return than capable with a spring. Furthermore, there is nothing structurally that would prevent such a modification and it appears that the modified device of Ferrati would perform equally well with a shock absorber (or any other means capable of quickly returning the member to its original length). The specific type of shock absorber (i.e., locking compression gas spring-type) is considered an obvious design consideration to one of ordinary skill in the art depending on the specific application the actuator is being used for and the needed control with extension and compression of the device.

Regarding claims 18 and 45, the modified Ferrati reference is silent as to an adjustment clamp. However, Van der Linde discloses that the springs can be made to have adjustable stiffness (column 2, lines 50-55) and adjustment clamps are well known and commonly used with springs to allow for adjustment of tension to individualize an actuator device. In addition, applicant has never disputed examiner's assertion that adjustment clamps are well known and therefore the claimed adjustment clamps are now considered to be admitted prior art. Therefore, it would have been obvious to one of ordinary skill in the art to add an adjustment clamp to the

modified Ferrati device, (particularly if the spring was located adjacent or outside the bladder) in order to allow a user to set a desired tension on the spring to control the strength and speed of return to its original length. Such a modification would involve the mere use of a well known method (adjustment clamps/knobs) in a well known device (spring of an muscle actuator) to yield predictable results that do not patentably distinguish an invention over the prior art.

**Claims 15, 17, 22-24, 42, 44, and 47-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ferrati in view of Van der Linde, Wassam and Erickson, as applied to claims 10-14, 18, 21, 37-41, 45, and 46 above, and further in view of Negishi et al. (US 5,158,005, herein referred to as “Negishi”).**

Regarding claims 15, 17, 42, and 44, the modified Ferrati reference is silent as to the specific location of the spring. However, Negishi discloses, in a similar air-filled actuator, that it is possible to mount a spring at least partially disposed over the inner bladder (see Figure 3a), which is also considered to lie adjacent the inner bladder because it is next to the inner bladder. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have mounted the spring in the modified Ferrati device over the inner bladder as taught by Negishi in order to provide the antagonist force to return the bladder to its original length using a well known spring position. Furthermore, because all of the claimed locations of the spring (inside, outside, adjacent) would produce the same movement, it appears as though Ferrati would perform equally well with the spring being mounted over the inner bladder.

Regarding claims 22 and 47, the modified Ferrati reference lacks a telescoping structure. However, Negishi discloses, in a similar air-filled actuator, two telescoping tubular shell

members (22) positioned over at least a portion of a braided material and bladder and a clamping device attached to each end of a spring (column 4, lines 45-55). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided Ferrati's modified device with a telescoping structure as taught by Negishi in order to hide and protect the inner working components of the actuator. Furthermore, there is nothing structurally that would prevent the addition of a telescoping structure to Ferrati and it appears as though the device would perform equally well with a telescoping structure as taught by Negishi.

Regarding claims 23, 24, 48, and 49, the modified McIntyre reference is silent as to which way the springs are clamped. Examiner notes however that the spring of Negishi is clamped in a stretched position so that it is compressed when the telescoping members expand (see Figure 3a). Upon removal of the force created by the pneumatic source, the compressed spring exerts a force that more quickly returns the telescoping portions to their original position (column 4, lines 35-45). Depending on the desired application and use of the device, whether the spring is clamped in a compressed or stretched position is considered an obvious design consideration to one of ordinary skill in the art because both positions would allow the bladder to return to its original length, just via different means (i.e., if the spring is clamped in a stretched position it will push the bladder back to its original length, and if the spring is clamped in a stretched position it will pull the bladder back to its original position). Furthermore, it appears as though the modified device would perform equally well with either type of spring clamping means/position.



**Claims 16, 17, 43, and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ferrati in view of Van der Linde, Wassam and Erickson, as applied to claims 10-14, 18, 21, 37-41, 45, and 46 above, and further in view of Chiel et al. (US 2003/0065250, herein referred to as “Chiel”).** The modified Ferrati reference is silent as to the specific location of the spring. However, Chiel discloses, in a similar air-filled actuator, a spring mounted inside the inner bladder (see Figure 2A), which is also considered to lie adjacent the inner bladder because it is next to the inner bladder. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have mounted the spring in the modified Ferrati device inside the inner bladder as taught by Chiel in order to provide the antagonist force to return the bladder to its original length and to minimize the chance of the spring getting tangled with/pinching a user. Furthermore, because all of the claimed locations of the spring (inside, outside, adjacent) would produce the same movement, it appears as though Ferrati would perform equally well with the spring being mounted inside the inner bladder.

#### ***Response to Arguments***

Applicant's arguments, filed 8/9/2010, with respect to the rejections of the claims under McIntyre have been fully considered and are persuasive. McIntyre only lifts the toe and thus would only produce contract in the longitudinal direction. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Ferrati and Van der Linde as discussed above.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KRISTEN C. MATTER whose telephone number is (571)272-5270. The examiner can normally be reached on Monday - Friday 9-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Justine Yu can be reached on (571) 272-4835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kristen C. Matter/  
Examiner, Art Unit 3771